

Association for Information Systems AIS Electronic Library (AISeL)

ACIS 2007 Proceedings

Australasian (ACIS)

2007

Structuration Theory in Information Systems Research: Relevance and Rigour from a Pluralist Research Approach

Dale Mackrell

Griffith University, d.mackrell@griffith.edu.au

Sue Nielsen

Griffith University, s.nielsen@griffith.edu.au

Follow this and additional works at: <http://aisel.aisnet.org/acis2007>

Recommended Citation

Mackrell, Dale and Nielsen, Sue, "Structuration Theory in Information Systems Research: Relevance and Rigour from a Pluralist Research Approach" (2007). *ACIS 2007 Proceedings*. 29.

<http://aisel.aisnet.org/acis2007/29>

This material is brought to you by the Australasian (ACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ACIS 2007 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Structuration Theory in Information Systems Research: Relevance and Rigour from a Pluralist Research Approach

Dale Mackrell
Griffith Business School
Griffith University
Nathan, Queensland, Australia
Email: d.mackrell@griffith.edu.au

Sue Nielsen
School of Information and Communication Technology
Griffith University
Nathan, Queensland, Australia
Email: s.nielsen@griffith.edu.au

Abstract

This paper reflects on the theoretical aspects of an earlier ontological study. The study was a single case which explored the use of an agricultural decision support system by women cotton growers in the Australian cotton industry and the effect of its use on their farm management roles on family cotton farms. The study was informed through a multi-paradigmatic conceptual framework with structuration theory as a meta-theory, and diffusion theory and gender relations theory as lower level theories. This pluralistic research approach employed both theory and data triangulation. In this paper, the justification for a multi-paradigmatic framework is discussed as well as the relevance and rigour of the study.

Keywords

Structuration theory, multi-paradigms, rigour, relevance, agricultural decision support system.

Introduction

The issue of pluralism in Information Systems (IS) research is contentious, with arguments motivated by the need to develop a mature discipline with a distinct research approach against the need to ensure rigour through reliability and relevance through flexibility. This paper reflects on the development and use of a pluralist research approach to a significant practical problem, namely, the use by women farm partners of *CottonLOGIC*, an agricultural decision support system (DSS), in the Australian cotton industry. The first author initially approached this question from an exclusively interpretivist perspective, viewing women's use of DSS and their roles in cotton farm management as socially constructed. However, the farm women's perceptions of the DSS as immutable, the need for cotton growers to accommodate their practices to industry targets to gain maximum benefit, and the insistence by the women that they were team members alongside their farm partners, prompted the authors to consider whether more than one research approach might be necessary to understand this complex problem. This paper therefore also considers the problem of incommensurability between paradigms in information systems research and the possible role of structuration theory in overcoming the objective-subjective dualism.

The structure of this paper is as follows. The background to the study is briefly described with more detailed information found in Mackrell (2006). The development of the research problem and the consideration of relevant theories is discussed which illuminate both the social nature of women's roles and the materiality of cotton farming and the DSS. The notion of incommensurability of research paradigms is considered in relation to the conceptual framework although this paper focuses on the rationale for adopting these diverse perspectives, namely, Giddens' (1984) structuration theory, Rogers (1995) diffusion of innovations theory and Connell's (2002) theory of gender relations. Finally, there is an evaluation of how the relevance and rigour of the research may be assessed.

Background to the Study

The Australian cotton industry today is confronted with a multitude of changes. The primary concern is still maximising the cotton yield, controlling production costs while ensuring cotton quality, and seeking optimum market prices. Yet environmental sustainability has become an imperative in the cycle of production. Cotton growers and their advisors are conforming in increasing numbers to self-regulatory practices such as Best

Management Practices (BMP) and Integrated Pest Management (IPM). Innovative technologies such as agricultural computer-based decision support systems (DSS) are considered a key to the adoption of sustainable farming systems (Hearn and Bange 2002).

The cotton industry has invested heavily into research and development. The transfer of new knowledge from researcher to grower means that growers can make decisions based on the best science available. Channels for transfer of knowledge are the rural extension service network; Web-based agronomy tools such as NutriLOGIC on the Australian Cotton CRC Website; paper-based information resources such as references resources EntoPAK, NutriPAK, WeedPAK, and the newsletter CottonTales; and the computer-based decision support tool *CottonLOGIC*. *CottonLOGIC* is an advanced farm management suite of software programs to aid the management of cotton production. The software was developed in Australia in the late 1990s by the Commonwealth Scientific and Industrial Research Organisation and the Australian Cotton Cooperative Research Centre, with support from the Cotton Research and Development Corporation. *CottonLOGIC* consists of record-keeping and decision support modules to assist cotton growers and their advisors in the management of cotton pests, soil nutrition, and farm operations. It provides for the recording and reporting of crop inputs and yields, insect populations (heliethis, tipworm, mirids and so on), weather data, and field operations such as fertiliser and pesticide applications. As well, *CottonLOGIC* enables the running of insect density prediction (heliethis and mites) and soil nutrition models for decision support (CRDC 2005).

The use of computers has become essential for farm decision makers, not only for communication, and information acquisition and transfer, but also for farm management. In many instances, farm women are the primary users of computers although previous research indicates that farm women are hesitant to use computers for farm management and their decision making roles in rural society are unclear. The study discussed in this paper sought to contribute to an understanding of how DSS enters into women's roles as farm partners on Australian family cotton farms. The research focused on Australian women cotton growers on family farms in south east Queensland and northern New South Wales. Data collection was predominantly through semi-structured interviews with 32 participants during one pilot study, two main field studies as well as telephone interviews over a period of three years. The participants were 14 women and 3 men cotton growers as well as 9 women and 6 men cotton industry professionals such as DSS developers, rural extension officers, researchers and educators, rural experimental scientists, and agronomists and consultants, all of whom advise cotton growers (Mackrell 2006).

The research method for this study was qualitative and ideographic where the social world is understood through obtaining first-hand knowledge of participants and the context of the study using an empathetic epistemology. In the study, there are influences from the functionalist perspective of diffusion theory with its deterministic and objective focus on technology, and from the radical humanist perspective of gender relations theory with its critical, emancipatory, and subjective focus on gender, power, and domination. Although the study was considered interpretivist, the multi-paradigmatic approach is consistent with the philosophy underlying structuration theory, as demonstrated later in this paper.

Development of the Research Framework; Incommensurability or Pluralism

During the pilot study, as well as clarifying some contextual questions, it confirmed the need to take into account a number of ideas which initially appeared contradictory. On the one hand, the women cotton growers viewed themselves as free agents, voluntarily adapting themselves to whatever was required to achieve success. On the other hand, they viewed their material circumstances as given or at least beyond their control, including the physical conditions under which they farmed, and their need to conform to government and industry regulations and best practice. Between these two extreme positions, *CottonLOGIC* was seen as enabling and constraining – constraining in terms of some of its functionality, and enabling, in terms of the way it might enhance decision making and farm management. Therefore an approach was sought which would accommodate these different perspectives.

The first author's experience with Rogers' (1995) diffusion of innovations theory suggested it would be an appropriate framework in which to examine the features of the DSS software in relation to users' adoption from a positivist perspective. However, diffusion theory provides little guidance on gender, except in relation to studies in developing countries. The second author's experience with Giddens' (1984) structuration theory indicated that it would be a suitable lens for exploring the farm women as human agents within the institution of cotton farm management. Although structuration theory also overlooked gender, it must be said, that in more recent publications such as *Modernity and Self-Identity* (Giddens 1991) and *Sociology* (Giddens 2001), Giddens displays views that are more sympathetic to feminist themes. In these volumes, Giddens argues his views of gender relations and gender differences, supporting Connell's (1987) theory of gender relations. In 2002, Connell revised his earlier 1987 theory of gender relations and this later conceptual model was considered an ideal framework for exploring gender themes in the study.

The pluralist research approach to theory immediately raised the problem of incommensurability of paradigms. A major argument in the Information Systems (IS) research literature is the dichotomies between research approaches. The four paradigms which have been most influential in IS research derive from classical sociological debate. They were categorised by Burrell and Morgan (1979) and further explored by Hirschheim and Klein (1989) amongst others. These four paradigms - functionalism or structuralism (objective-order); social relativism or interpretivism (subjective-order); radical structuralism (objective-conflict); and neohumanism or radical humanism (subjective-conflict) provide four sets of basic assumptions (ontology, epistemology, methodology, and human nature) about the social world. Burrell and Morgan (1979, p.25) propose that:

The four paradigms are mutually exclusive ... they offer different ways of seeing. A synthesis is not possible. ...one cannot operate in more than one paradigm at any given point in time, since in accepting the assumptions of one, we defy the assumptions of all the others.

Furthermore, Weaver and Gioia (1994, p.565) summarise the view taken in organisation science, that there is “no common measure among paradigms of inquiry” nor “meaningful communication” across paradigms.

Nevertheless, the four paradigms approach has many critics. Deetz (1996) argues that the Burrell and Morgan’s framework reifies research approaches and offers an alternative paradigmatic framework to represent modern organisational research and practice. Barley’s early review of Burrell and Morgan’s framework argues that it provides a good account of approaches which “fall at opposite extremes of the dimension within the paradigm” (Barley 1980, p.93) but would rankle many sociologists who consider their perspectives to be very different but who are categorised as ‘functionalist’. Cox (1979) also criticises the authors for their use of the term paradigm in distinctly ‘un-Kuhnian’ ways and for claiming to have found “four hermetically sealed and mutually exclusive ‘paradigms.’” (Cox 1979, p.3).

While these and many other authors debate the usefulness and coherence of Burrell and Morgan’s framework, others offer solutions to the notional problem of incommensurability. Gioia and Pitre (1990) propose a multi-paradigmatic approach through the use of transition zones to bridge paradigms. McMurray, Pace and Scott (2004, p.9), in their text on research, agree that a single coherent paradigm may not be possible but put forward a sensible resolution:

... it may be possible to acknowledge the contradictory nature of the two paradigms, but still draw on relevant methods... carefully acknowledging the differences and the assumptions that bring about the differences.

This stance is also consistent with that taken by authors such as Hassard (1991) who propose that rather than attempting to integrate these dichotomous approaches, a pluralist strategy should be adopted, allowing for the application of multiple paradigms.

Rationale for the Research Framework: Structuration Theory as a Meta-Theory

Weaver and Gioia (1994) argue that, although integration of the dichotomous views may not be feasible, it is possible to achieve a unified body of knowledge through structuration theory (Giddens 1984), which conceives the dichotomies as dualities rather than dualisms. Structuration is a social process that involves the reciprocal and repetitious interaction of human agents and the structural features of social systems by effective communication. Structuration theory is a relatively abstract, conceptually grand sociological theory based on social practice, developed by contemporary social theorist Giddens (1984) in the earlier stages of his academic and publishing career. The duality of structure is a central principle of structuration theory and refers to the shaping of the institutional properties of social systems as the result of human actions, which in turn reshape human actions. The mutual dependence of human actions and social structures is evident. As Giddens (1984 p.25) states “the structural properties of social systems are both medium and outcome of the practices they recursively organise”. Essentially, social reality is constructed when social institutions and practices are produced and reproduced. The actor is also socially constructed. The duality of structure with its multi-paradigmatic perspective shows how theoretical pluralism may be allowed through structuration as a meta-theory (Weaver & Gioia 1994).

Giddens acknowledges the existing incommensurability of the paradigms as a dualism and proposes the duality of structure from structuration theory as a means of bridging that gap. In the introductory chapter to *The Constitution of Society*, Giddens (1984, p.xx) states:

Of prime importance in this respect is a dualism that is deeply entrenched in social theory, a division between objectivism and subjectivism ... Structuration theory is based on the premise that this dualism has to be reconceptualized as a duality – the duality of structure.

In Giddens’ own view, structuration theory represents a reaction to the divisions and perceived deficiencies of the opposing prevailing schools of sociological thought. Structuration theory is purported to be a means of

breaking free from the weaknesses of functionalism that underplay the importance of human action, and the opposing interpretive sociology that is “strong on action, but weak on structure” (Jones 1999, pp.106-107). Giddens (1984, p.xxvii) explains, “... in formulating structuration theory I wish to escape from the dualism associated with objectivism and subjectivism”. All the same, Giddens reveals very little specificity regarding his epistemological and methodological approaches. In Held and Thompson (1989, p.294), Giddens refers to “my emphasis upon ontology rather than epistemology” and that he has “an eclectic approach to method, which again rests upon the premise that research enquiries are contextually oriented” (1989, p.296). In *The Constitution of Society*, Giddens (1984, xxx) reveals:

I do not try to wield a methodological scalpel. ... The points of connection of structuration theory with empirical research are to do with working out the logical implications of studying a ‘subject matter’ of which the researcher is already a part and with elucidating the substantive connotations of the core notions of action and structure.

Rose and Scheepers (2001, p.6) assert that Information Systems is multidisciplinary with root traditions in management and computer science. These provide a technologically deterministic and positivist slant to IS research. Structuration theory, with its theoretical diversity as well as social constructivist and interpretive leanings, is a welcome and robust departure from tradition. Therefore, structuration theory is a useful meta-theory for IS research, within which a diversity of approaches, theories, and methodologies can be contained (Jones 1999; Walsham & Han 1990; Walsham 2005). Ultimately in the study, the question of incommensurability took second place to ensuring that the research remained focused on the practical problem, namely, how women were using *CottonLOGIC*, and how that related to their role as farm partners in the context of the Australian cotton industry, acknowledging that when research was being carried out “walls between paradigms break down” (Firestone 1990, 9.123).

Findings from a Pluralist Research Approach

As explained, the theoretical framework of the study was complex with multiple conceptual levels. Structuration theory was applied as a meta-theory. Reflecting the philosophy of structuration theory, the institutional structure of farm management and the human agency of cotton growers were explored as a duality to overcome the incommensurability between opposing objective-subjective views of the social world, with the technological innovation *CottonLOGIC* as both medium and outcome of human action. Technology has received little attention in structuration theory, yet its importance in modern society has led to the formulation of theories to extend our understanding of technology in social research. Orlikowski (2000) proposed the technology-in-practice model based on structuration theory and this model was used as a basis for analysing *CottonLOGIC* as a technology in use rather than as an artefact.

The findings of the study were that *CottonLOGIC* users are creative and adaptable as they mould the software to their farming objectives, in ways unforeseen by the software designers and developers (Mackrell 2006). As an example, Julia, a cotton grower, expressed a realisation that *CottonLOGIC* was not cotton-specific but could be used to record grain as well as cotton data.

Julia (grower): I just looked at CottonLOGIC. It's designed for cotton. You could put grain things in there.

Diffusion of innovations theory by Rogers with its positivist viewpoint offered a structure for examining the characteristics of the agricultural DSS *CottonLOGIC* as a technological innovation, and of the adoption stage reached by participants through the innovation-decision process. Diffusion theory is a comprehensive theory with multiple concepts. The four main elements of diffusion theory are the innovation, communication channels, social systems, and time. Rogers argues that diffusion is an inherently social process and the structure of the social system can affect an innovation's diffusion. Rogers claims that the five most important characteristics of innovations that affect the rate of adoption are relative advantage, compatibility with previous values, complexity of the innovation, trialability, and observability. Rogers asserts that diffusion of an innovation takes place in a time-ordered sequence as an innovation-decision process. The first nine chapters of the *Diffusion of Innovations* by Rogers (1995) relate to diffusion as it applies to individuals. The final chapter, chapter ten, goes further and addresses innovation adoption within organisations. This was relevant to the study that covered both individuals (cotton growers and industry professionals) and social institutions (the Australian cotton industry). Yet, traditional diffusion theory alone was unsuited for application in environments where innovations are linked to sustainable resource management technologies such as *CottonLOGIC*. For this purpose, additional attributes such as intellectual outlay were deployed from the environmental diffusion model proposed by Vanclay and Lawrence (1995).

Communication is a construct within both structuration and diffusion theories. In exploring interpersonal networks, the study found that many couples in family farm partnerships stressed the importance of teamwork (Mackrell 2006). As an example, Selma, a grower, worked a great deal in the farm office. Selma's involvement

in industry grower associations meant that her role on the farm extended beyond bookkeeping and human resources towards strategic production decisions. She had very firm views on the running of a successful cotton and cattle property, and the importance of good management. Therefore, it was Selma, not her farm partner Bill, who noted that Bill should have more involvement in farm management with a reduced emphasis on outdoor work. Selma's comments implied a reversal of the commonly accepted attitude that inside office work (unlike outside physical work) is not considered to be real work.

Selma (grower): *We work as a team really. I'm more focussed on the administration side of things. Bill [farm partner] is more focussed on the day-to-day running, and keeping out of the office which he shouldn't do. He needs to be more involved.*

It must be mentioned that Selma did not limit her farm involvement to the office and she willingly worked alongside Bill when circumstances dictated that her labour was required out in the paddocks.

As mentioned, diffusion theory was adopted to provide a basis for understanding how and why women were using (or not) *CottonLOGIC*. Although this yielded useful information, diffusion theory was not helpful for elaborating the role of gender, nor was structuration theory found informative in this respect. In 1987, Connell published a social theory of gender relations, sympathetic with structuration theory. Connell (1987) identifies three main social structures: the division of labour; the exercise of power; and 'cathexis' which encompasses the domain of sexual social relationships. In 2002, to harmonise with changing views of gender, Connell revised his original theory of gender relations (1987). This modified contemporary model describes four main conceptual dimensions of gender. These are production, power, emotional, and symbolic relations. Connell (2002, p.68) explains that while these dimensions are analytically separate, in practice they constantly intermingle.

Gender relations theory by Connell (2002), from the critical and emancipatory persuasion, was used to subjectively explore the complex relationships between farm partners. It was evident that since family cotton farms are small businesses, managing the production aspect dominated the responses by interviewees. In the context of power relationships, it was apparent that women growers influenced the strategic decisions, based on their financial knowledge, but not so much the decisions associated with the production side of farming, due to their lack of agricultural knowledge. Furthermore, a strong emotional relationship between farm partners was essential to ensure a successful family farm business. This was recognised by Kylie who had dual roles as a farm partner and a cotton consultant.

Kylie (professional): *They [women] are very much a partner in the business and unless you have both the financial and production sides of things working very well, you're not going to make money today because farming's a business ... if you didn't have a wife to do it, you'd have to pay somebody else and nine times out of ten, they [women] know the business so well that they really adding value with what they are doing.*

According to Connell (2002, p.9), "gender relations do include difference and dichotomy, but also include many other patterns" but "the key is to move from a focus on differences to a focus on relations". This was a fundamental message from the findings of the study.

Nevertheless, further theoretical perspectives were needed to examine gender distinctions in information technology usage. These were addressed in the study through individual differences theory by Trauth (2002). Individual differences theory in gender and IT, which represented the middle ground between essentialism and social constructivism, was found to be important. While some interviewees regarded certain behaviours as gender-defined such as the tendency by males to avoid filling in forms, it was also apparent that there were some socially constructed differences such as the book keeping role traditionally adopted by women in the home. All the same, there was growing evidence of individual differences in interacting with technology supplanting the essentialist and socially constructed approaches to gender differences. This was noticeable when individuals performed certain tasks to which they were neither predisposed by biology nor socially compelled. For example, several women displayed individualistic choice in performing functions such as marketing cotton or driving tractors that had traditionally been male roles. This characteristic had been observed by Diane, a growers' service manager. She commented that women were often just as interested in the more technical aspects of production as the men. They appreciated being able to learn and work alongside their male farm partner.

Diane (professional): *The other thing I find interesting is when they have the IPM [Integrated Pest Management] courses, even leadership courses and things like that, it's never just the blokes that go, it's the blokes and their wives. I think that shows their interest.*

Adhering to Burrell and Morgan's (1979) categorisation of paradigms, the assumptions underlying the research framework can be summarised as in Table 1 below.

Table 1: Summary of Assumptions for each Theory Used in the Study

Assumptions	Structuration Theory (Meta-Theory)	Diffusion Theory (Functionalist Paradigm)	Gender Relations Theory (Radical Humanist Paradigm)
Ontology	Duality	Realist	Nominalist
Epistemology	Anti-positivist	Positivist	Anti-positivist
Human Nature	Duality	Determinist	Voluntarist
Methodology	Ideographic	Nomothetic	Ideographic

In review, the pluralist research approach was valuable as a structure for the analysis and interpretation of data. The study recognised that the agricultural DSS *CottonLOGIC* is a valuable tool for supporting environmental, economic and social sustainability principles. The study found gender differences and inequalities in rural Australia, nevertheless, women cotton growers are not passive agents but are taking responsibility for their own futures. With the awareness and confidence gained through involvement in interpersonal networks such as farm partnerships and the acquisition of technological skills through use of software such as *CottonLOGIC*, they are constructing and reconstructing their lives. In particular, DSS tools like *CottonLOGIC* are instrumental in enabling women cotton growers to adapt to, challenge, and influence farm management practices in family farm enterprises.

Quality of Interpretive Case Study Research

The assumption of interpretive research, that reality is socially constructed, subjective and relative, implies that the findings from these studies cannot be judged as representing an objective truth. Becker and Niehaves (2007) discuss the controversy over positivist and interpretivist research which leads to different understandings of concepts such as validity and reliability. Unlike quantitative research, there are no straightforward tests for quality since every qualitative study is unique. All the same, there are guidelines for the qualitative researcher requiring judgement, persistence, truthfulness, and some creativity.

One such set of guidelines are the seven fundamental principles for the conduct and evaluation of interpretive field studies in IS devised by Klein and Myers (1999). Derived from hermeneutics, the guidelines dictate that an understanding of the whole is required by an interpretation of its parts and their relationships. In an example from the study, the 'parts' are the authors' preliminary understandings of the relationships of women cotton growers in farm management teamwork with their male farm partners. The 'whole' is emergent, shared meanings from further interactions with participants, including industry professionals, when the women's roles were more holistically evaluated. This occurred iteratively through subsequent field studies and analysis within the multi-paradigmatic framework, thus improving the rigour of the study. It is associated with most of the seven fundamental principles by Klein and Myers especially the principle of contextualisation, the principle of dialogical reasoning, and the principle of multiple interpretations.

If we accept the research framework as pluralist, then it would follow that each theoretical perspective should be evaluated according to the criteria relevant to the assumptions (as indicated in Table 1). The evaluation focused on criteria for interpretive case studies and the use of triangulation, discussed in the next section. On reflection, it also seems worthwhile to attempt an evaluation using some of the criteria proposed by Giddens (1984) for social science empirical research, and these are discussed as follows.

Firstly, Giddens (1984, p.284) argues that all social science research is necessarily ethnographic, in that the "field of study phenomena ...are already constituted as meaningful". The researcher enters a field where the actors are knowledgeable about their daily lives. In studying these meanings (what may be referred to as 'first-order concepts') the researcher utilises theories or derives concepts to create 'second-order' concepts, understanding that "it is in the nature of social science that these can become first-order concepts by being appropriated within social life itself". The research should therefore be written in such a way that those unfamiliar with the situation should understand it and provide relevant frames of reference which will enrich the reader's understanding. The evaluation must therefore refer to interested readers for their assessment of clarity and helpfulness. This criterion is similar to the principle of the hermeneutic circle, and Giddens (1984, p.284) also refers to the 'double hermeneutic' and the need for the various "interpretative categories which demand an effort of translation in and out of the frames of meaning involved in sociological theories".

Secondly, Giddens (1984, p.285) asserts that the researcher needs to be “sensitive to the complex skills which actors have in coordinating the contexts of their day-to-day behaviour”. This facet emerged most distinctly in relation to the notion of farm partnerships, discussed earlier, where the skills which the women used to accommodate the vicissitudes of farm life were difficult to explain via the perspectives initially adopted. Giddens reminds us in this regard that all research has reductionist tendencies in that ideas and skills which might appear routine and familiar are likely to be eliminated during analysis and the focus fall on what is unusual or unintended. The women’s preparedness to do whatever was required and to fit their own work around their male partners’ was initially viewed as reinforcing social convention, what Giddens (1984, p.286) might refer to as “unintended aspects of the reproduction of social systems”. However, further investigation using individual difference theory by Trauth (2002) revealed this as reflexively monitored by the women and a response to the physical circumstances of their work rather than conformity to social expectations.

Lastly, Giddens (1984, p.286) reminds the social analyst to “be sensitive to the time-space constitution of social life”. The first author had a particular interest in the industry study and provided sufficient background information on development of the cotton industry and farming practices in Australia to be comprehensible to overseas readers. This study would suffer from not taking into account the problems and challenges facing the cotton industry, within which *CottonLOGIC* played a role. This principle clearly relates to Klein and Myers’ (1999) principle of contextualisation referred to above.

Much of this discussion also deals with the notion of relevance and the authors may gauge the value of the research by the reactions of participants and readers, which generally indicates that the interpretations were meaningful and helpful. It is beyond the scope of the present paper of course to assess to what extent these ideas have been incorporated into the participants’ own views of their world.

Triangulation

In her research methods text, De Laine (1997, p.48) advocates triangulation as being a major criterion “for evaluating the rigour of qualitative research”. According to Schwandt (2001, p.257), “triangulation is a means of checking the integrity of the inferences one draws”. Denzin (1989, p.247) explains that “by combining multiple observers, theories, methods, and empirical materials, sociologists can hope to overcome the intrinsic bias and problems that come from single-method, single-observer, and single-theory studies”. In brief, triangulation is a means to establish rigour and therefore validity in the research process by addressing inherent stakeholder prejudices and design flaws.

Social theorists Denzin (1989) and Patton (2002) identify, classify and describe four basic types of triangulation:

- I. data or sources triangulation where a variety of data sources are used
- II. investigator or analyst triangulation where several researchers carry out the study
- III. theory or perspective triangulation where multiple theories are used to analyse and interpret the data, and
- IV. method triangulation where qualitative and quantitative data collection methods are used

The study utilised both data and theory triangulation. Data triangulation is the collection of data from different people at different locations over different times. This strategy is generally believed to reduce the risk of systematic biases and the limitations associated with a specific data collection method (Denzin 1989). Interviewees in this study represented two main stakeholder groups: cotton growers and cotton professionals. Because of their occupations, they had different perceptions on the same topic except in instances where a participant was both a cotton grower and a professional. Furthermore, interviews were conducted over an extended period of three years by both field studies and telephone.

Theory triangulation took place in the study when analysing and interpreting the same data using multiple theoretical frameworks. Gioia and Pitre (1990, p.599) found that “multiparadigm approaches to theory building can generate more complete knowledge than any single paradigmatic perspective”.

Conclusion

This paper reflects on the development and use of a pluralist research approach in a single case study. Although the research was ontological with a practical focus, it was informed by a complex theoretical multi-paradigmatic framework to offer insight into the lives of women on Australian family cotton farms and their use of an agricultural DSS, *CottonLOGIC*, in their farm management roles. The use of multiple theories from apparently opposing paradigms was an exploratory undertaking to enrich the data collection, analysis, and interpretation. The main theories of the study, structuration theory by Giddens (1984), diffusion theory by Rogers (1995), and gender relations theory by Connell (2002), were based on opposing paradigmatic assumptions. As a

consequence, the study was informed through the richness of multi-paradigmatic perspectives and an abundance of sensitising concepts which was reflected also in the methodological implications of the study. The study was enriched further by drawing, to a lesser extent, on other theories (Orlikowski 2000; Trauth 2002; Vanclay & Lawrence 1995).

Although the authors were concerned about the rigour of the research, the main interest was in providing a relevant and useful interpretation of what was happening in the Australian cotton industry. This approach is supported by Fitzgerald and Howcroft's summary of the concerns of different research approaches, in which they indicate that relevance is more important at the axiological level for interpretive research, being concerned with "eternal validity of actual research question and its relevance to practice ... rather than constraining the focus to that researchable by 'rigorous' methods" (Fitzgerald & Howcroft 1998, p. 159). Theoretical perspectives were therefore sought in order to illuminate the topic rather than to force the data into rigid categories. The use of structuration theory which conceptualises these opposing perspectives as dualities rather than dualisms seemed to answer the incommensurability problem which is still contentious in the Information Systems discipline.

References

- Barley, S.R. (1980) 'Sociological Paradigms and Organisational Analysis: Review'. *Sloan Management Review*, vol. 21, pp. 92-95.
- Becker, J. and Niehaves, B. (2007) 'Epistemological perspectives on IS research: a framework for analysing and systematizing epistemological assumptions'. *Information Systems Journal*, vol. 17, pp. 197-214.
- Burrell, G. and Morgan, G. (1979). *Sociological paradigms and organisational analysis: elements of the sociology of corporate life*, Heinemann, London.
- Connell, R. W. (1987). *Gender and Power: Society, the Person and Sexual Politics*, Stanford University Press, Stanford, CA.
- Connell, R. W. (2002). *Gender*, Polity Press, Cambridge, UK.
- Cox, D. (1979) 'Review of Sociological Paradigms and Organisational Analysis: Gibson Burrell and Gareth Morgan'. *Reviewing Sociology*, vol. 1, pp. 3-5.
- CRDC (2005). *Cotton Research and Development Annual Report 2004-2005*, Australian Government, Narrabri, NSW.
- de Laine, M. (1997). *Ethnography: Theory and Applications in Health Research*, MacLennan & Petty, Sydney, NSW.
- Deetz, S. (1996). 'Describing Differences in Approaches to Organization Science: Rethinking Burrell and Morgan and their Legacy', *Organization Science*, vol. 7, no. 2, pp. 191-207.
- Denzin, N. (1989). *The Research Act: A Theoretical Introduction to Sociological Methods*, Prentice-Hall, Englewood Cliffs, NJ.
- Firestone, W. (1990) 'Accommodation; towards a paradigm-praxis dialectic', in E.Guba (ed.), *The Paradigm Dialog*, Sage, London, UK.
- Fitzgerald, G. and Howcroft, D. (1998) 'Competing dichotomies in IS research and possible strategies for resolution'. Proceedings of the International Conference on Information Systems, Helsinki, pp. 155-164.
- Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*, University of California Press, Berkeley and Los Angeles, CA.
- Giddens, A. (1991). *Modernity and Self-Identity: Self and Society in the Late Modern Age*, Polity Press, Cambridge, UK.
- Giddens, A. (2001). *Sociology*, Polity Press, Cambridge, UK.
- Gioia, D. and Pitre, E. (1990). 'Multiparadigm Perspectives on Theory Building', *The Academy of Management Review*, vol. 15, no. 4, pp. 584-602.
- Hassard, J. (1991) 'Multiple paradigms and organizational analysis: a case study'. *Organizational Studies*, vol. 12, no. 2, pp. 275-299.
- Hearn, A. B. and Bange, M. P. (2002). 'SIRATAC and CottonLOGIC: persevering with DSSs in the Australian Cotton Industry', *Agricultural Systems*, vol. 74, pp. 27-56.

- Held, D. and Thompson, J. (Eds) (1989). *Social theory of modern societies: Anthony Giddens and his critics*, Cambridge University Press, Cambridge UK.
- Hirschheim, R. and Klein, H. (1989). 'Four Paradigms of Information Systems Development', *Communications of the ACM*, vol. 32, no. 10, pp. 1199-1214.
- Jick, T. D. (1979). 'Mixing Qualitative and Quantitative Methods: Triangulation in Action', *Administrative Science Quarterly*, vol. 24, pp. 602-609.
- Jones, M. (1999). 'Structuration Theory', *Rethinking Management Information Systems*, W. L. Currie and B. Galliers (Eds), Oxford University Press, New York, USA.
- Klein, H. K. and Myers, M. D. (1999). 'A Set of Principles for Conducting and Evaluating Interpretative Field Studies in Information Systems', *MIS Quarterly*, vol. 23, no. 1, pp. 67-93.
- Mackrell, D. (2006). *Women as Farm Partners: Agricultural Decision Support Systems in the Australian Cotton Industry*, unpublished PhD, Griffith Business School, Griffith University, Brisbane Qld.
- McMurray, A., Pace, R. W. and Scott, D. (2004). *Research: a commonsense approach*, Thomson Social Science Press, Melbourne, Vic.
- Orlikowski, W. (2000). 'Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations', *Organization Science*, vol. 11, no. 4, pp. 404-428.
- Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods*, Sage Publications, Thousand Oaks, CA.
- Rogers, E. M. (1995). *Diffusion of Innovations*, The Free Press, New York, USA.
- Rose, J. and Scheepers, R. (2001). 'Structuration Theory and Information Systems Development - Frameworks for Practice', Proceedings of the 9th European Conference on Information Systems (ECIS), Bled, Slovenia.
- Schwandt, T. A. (2001). *Dictionary of Qualitative Enquiry*, Sage Publications, Thousand Oaks, CA.
- Trauth, E. M. (2002). 'Odd girl out: an individual differences perspective on women in the IT profession', *Information Technology and People*, vol. 15, no. 2, pp. 98-118.
- Vancly, F. and Lawrence, G. (1995). *The Environmental Imperative: Eco-Social Concerns for Australian Agriculture*, Central Queensland University Press, Rockhampton, Qld.
- Walsham, G. (2005). 'Agency Theory: Integration or a Thousand Flowers', *Scandinavian Journal of Information Systems*, vol. 17, no. 1, pp. 153-158.
- Walsham, G. and Han, C-K. (1990). 'Structuration Theory and Information Systems Research', Proceedings of the 11th International Conference on Information Systems (ICIS), Copenhagen, Denmark.
- Weaver, G. and Gioia D. (1994). 'Paradigms Lost: Incommensurability vs Structurationist Inquiry', *Organization Studies*, vol. 15, no. 4, pp. 565-590.

Copyright

Dale Mackrell and Sue Nielsen © 2007. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.